

EXHIBIT – I

Scope of Work for Extruders Overhaul in TA 2022; SPCO South

1.0 DESCRIPTION OF WORK – GENERAL

Except as otherwise expressly provided elsewhere in this Contract, CONTRACTOR shall provide all labor, supervision, material, equipment ,inspection resources, prepare record books, furnish all materials, transportation, freight forwarding, customs clearance, material receiving and handling, warehousing services, utilities, supplies, tools & equipment, temporary facilities and each and every item of expense necessary for the “ **Site Execution Services for Inspection And Overhaul On Extruder Machines At Unit 42,43 & 44**” at the COMPANY facility in Jubail Industrial City.

2.0 DESCRIPTION OF WORK

Synopsis

We are planning a major overhaul/Repair activity on our extruder machines and extruder’s system related works at Unit 42, 43 & 44 of our Plant SPCO (south). Work will be completely executed by your company’s Engineers , Supervisors , site crews for Gear box & process parts under supervision & advice of OEM’s Engineers. Therefore, this scope covers both execution & supervision to comply quality , safety & schedule requirements.

Site Contractor will provide assistance to Coperion’ s team for handling various parts, hydro-blasting, cleaning, lifting, dismantling, fitting, shifting & other maintenance tasks. Coperion will be provided all the support of site resources by Schem ’s contractor through this scope. This manpower will consist of Rotary technicians, Fitters, Riggers, Insulators, Electricians, Instrument Fitters, Scaffolders & helpers.

Barrel may need to go under chemical cleaning , but for this particular activity a separate contractor will be hired by Schem and this scope does not cover “ chemical cleaning”. However, to meet the requirement of chemical cleaning , necessary site support & coordination for isolation/blinding would be done under this scope.

So, it is expected that while submitting its technical proposal, contractor will make sure to include the Manpower, equipment & tools to be utilized/deployed for all three units based on 24 Hrs. activity schedule along with meeting all requirements of technical proposal listed in technical proposal requirements. Being the responsible for the scope execution & completion with meeting quality & safety standards, it is also desired that contractor will not limit its technical proposal up to the requirements put forward by Schem only and will incorporate all necessary technical details whatever in his opinion are “must include” details relevant to the project in hand.

Intent of engaging Contractor in a lump sum contract for subject scope means that Contractor would be having ultimate responsibility & ownership of the work execution till its completion within the agreed time frame conforming work quality parameters.

Scope of work has been derived on the basis of history of the equipment, maintenance activities carried out during TA 2016 & afterward till date and also refined by the review discussions & Meeting held on scope among reliability, TA, operation & Coperion(OEM) team. Detailed scope has been drafted on basis of following key Understanding & agreements over overhaul strategy of extruders and are listed as under.

- All bearings, seals & O-rings would be replaced as part of standard overhaul activity
- In case of Discovery after inspection screw shaft ,replacement would be carried out
 - For Unit42/43 , 01 screw shaft available , Elements would also be available.
 - For Unit 44 , Screw & Elements would eb available.
- In case of Discovery after inspection of Barrels , replacement decision will be taken.

- For Unit 42 Barrels are available in stock
- For Unit 43/U44 New barrel would be available as per OEM's recommendations
- Screw & Barrels will be hydro blasted. In addition, Barrels will be chemically cleaned also (in case Old barrels are in good enough condition and are recommended to be re-used after inspection.) Chemical cleaning is not part of this contract , as separate contractor will be engaged. However, to transport it to separate yard for chemical cleaning , it would be contractor's responsibility.
- All hard Parts, screens & strainers would be cleaned & inspected. NDT will be performed on hard parts as described in detailed scope. NDT will be done by Schem but preparation for NDT is contractor's scope.
- Wear Measurements for screw shafts & Barrels would be recorded using COBRA instrumentation by OEM. Facilitation to make it possible in terms of cleaning requirements , would be contractor's scope.
- All Oils & lubricants would be replaced. Supplies would be by Schem , services by contractor.
- All damaged Elements & flights will be replaced.
- Leak tests of Screw/Barrel assemblies & No-Load Test Run.

(Detailed scope against each Tag no is described in scope table , part of this document in following section)

Composition of Bid Documents

Bid document has been sub-divided in **Two major sections**.

- **Section – A;** This section explains the Brief & Detailed scope of work, Split Task Lists of Sub-assemblies on Extruder , Timelines , Requirements for technical proposal . For ease of cost evaluation unit wise, a summary table for all units along with individual units have been made part the document. This section consists of following sub-sections as under;

- *Sub-Section-1; Scope Brief*
 - *Sub-Section-2; Detailed Scope (List of Worklist Items Unit Wise Divided in 03 Categories)*
 - *Sub-Section-3; Timelines (Available Maintenance Windows)*
 - *Sub-Section-4; Requisites of Technical Proposal*
 - *Sub-Section-5; Parallel Scopes (Extruder Building Jobs to be carried out independently by Schem or Schem's contractor, Not part of this scope)*
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- **Section – B;** This section contains information about General and Scope Related Special terms & conditions for Bid Scope. This Section Contains Contractors & Schem's responsibilities & requirements specific with current scope (Point No 1 & 2) and standard contractual Terms & Conditions (Point no 3 onward) .

SECTION –A

SCOPE OF WORKS

Sub-Section-A; Scope of Work (Brief)

A brief for SOW will be highlighted in this section. Scope of Work for each Unit has been divided in 03 major parts (Process Section, Gear Box Section & Dryers). This Brief summary of scope has been expanded in detailed maintenance scope in the later part of the document with clear demarcation in accordance with the segments of brief scope and also are marked with the Job IDs. Price Schedules have been designed on pattern of “Scope Brief “described as under.

Important Note; It is also note-worthy that some scope on extruder systems will be carried out by Schem’s own maintenance team or its subcontractors, independent of This Bid’ s scope and is listed **in separate section-6 of parallel jobs**. Purpose of keeping Schem’s Parallel scope in bid document is to communicate Bidder of this Bid Document about the possible schedule interface & integration. It may facilitate the bidder for optimization of schedule & Resources.

1. Unit 42/ZSK380 /HDPE

- 1.1. **Overhaul Screws, Barrels & Process Section assemblies;** Overhauling of Screw & Barrels that includes all dismantling & Re-assembling of process parts, existing barrels & screws, screen changer, Die Head housing, pelletizer system (assembly & Gear Box), DAV valves, Hydraulic system & other accessories. Replacement of the damaged parts.
- 1.2. **Overhaul Suprex gearbox:** Replacement of wearable parts at a minimum; Replace Oil. Change all bearings and sealing, check all installed parts as gears and shaft. This job also involves Uncoupling & Recoupling of Motor with Gear Box, solo run testing & alignment of Main Drive Motor. *(Motor Dismantling, Overhauling, Installation, Rigging or electrical testing is not part of this scope).*
- 1.3. **Overhaul Pellet Dewatering Dryers 42X84/85;** Replacement of Bearings, sprockets & Dry Screens

2. Unit 43/ZSK380 /LDPE

- 2.1. **Overhaul Screws, Barrels & Process Section assemblies;** Overhauling of Screw & Barrels that includes all dismantling & Re-assembling of process parts, existing barrels & screws, screen

changer, Repair of Any Polymer leaks , Die Head housing, pelletizer system (assembly & Gear Box), DAV valves, Hydraulic system & other accessories. Replacement of the damaged parts.

2.2. **Overhaul Suprex gearbox:** Replacement of wearable parts at a minimum; Replace Oil. Change all bearings and sealing, check all installed parts as gears and shaft, Repair of Gear Box Bolts. This job also involves Uncoupling & Recoupling of Motor with Gear Box, solo run testing & alignment of Main Drive Motor. *(Motor Dismantling, Overhauling, Installation, Rigging or electrical testing is not part of this scope).*

2.3. **Overhaul Pellet Dewatering Dryers 43X84/85;** Replacement of Bearings, sprockets & Dry Screens

3. **Unit 44 / ZSK350 / PP**

3.1. **Overhaul Screws, Barrels & Process Section assemblies;** Overhauling of Screw & Barrels that includes all dismantling & Re-assembling of process parts, existing barrels & screws, screen changer, Die Head housing, pelletizer system (assembly & Gear Box), DAV valves, Hydraulic system & other accessories. Replacement of the damaged parts.

3.2. **Overhaul Flender gearbox;** Replacement of wearable parts at a minimum; Replace Oil. Change all bearings and sealing, check all installed parts as gears and shaft. This job also involves Uncoupling & Recoupling of Motor with Gear Box, solo run testing & alignment of Main Drive Motor. *(Motor Dismantling, Overhauling, Installation, Rigging or electrical testing is not part of this scope).*

3.3. **Overhaul Pellet Dewatering Dryer 44X84;** Replacement of Bearings, sprockets & Dry Screens

Note; following support would be provided by S-Chem

- *Instruments Dismantling*
- *Electrical disconnections*
- *Scaffolding & Insulations*
- *Material handling & Rigging*
- *Sub-contractor's support*

Sub-Section 2; DETAILED MAINTENANCE SCOPE

Detailed Maintenance Scope of Work for Extruder's Overhaul Unit 42,43 & 44

Unit 42, HDPE Scope

Line:	Unit 42
Machine:	ZSK 380
Machine no.:	20507503
Project no.:	64020862
SWZ:	21000
MP:	NA
UG:	1000
Polymer	HDPE
manufactured	2009

Extruder's System Related- Rotating Scope - Unit 42

OEM-SC - OEM & Subcontractor

SOW Doc Ref#	JOB ID	Unit	Tag No	Equipment Name	Scope of Work	Equipment Group	Execution Strategy
1.1	SPCo-SP-0726	42	42V80	Extruder	1. Remove screw shafts for wear measurement. 2. Hydro blast polymer from screw shafts. 3. Unstack screw shaft elements for inspection for wear & Replacement (AWR) as recommended. 4. Verify spare screw timing using roll test before installing in barrels. 5. Clean elements and NDT splines for cracks. 6. Clean and NDT screw shaft for cracks. 7. Hydro blast barrels for inspection. 8. Measure barrel wear using COBRA instrumentation. 9. Remove barrels to replace gaskets if required due to polymer leaks. 9a; If Barrel replacement is decided after inspections , these would be replaced(AWR) 10. Overhaul the screw shaft seal if worn, replace the sealing set. 11. Check all heating and cooling connection piping and valves. 12. Check the instruments, N2 control unit of Mecos seals. 13. Chemical cleaning by Acid flushing all barrel sections. 14. Perform leak test for cooling and heating circuits. 15. Replace Mecos seals. 16. Grease the screw shaft couplings. Note ; Spare Barrel & Elements would be available If barrels would be replaced, then chemical cleaning would be not required on old barrel (By other contractor)	Rotating	OEM-SC

1.1	SPCo-SP-0728	42	42DAV	Extruder Startup valve DAV - 42A404	1. Remove DAV plug and clean excessive polymer leak. 2. Remove DAV/SUV housing for screw removal. 3. Replace hydraulic cylinder. 4. Hydro blast DAV to remove degraded polymer. ----- Check Notification # 11861430 and confirm with Shafi. 15.JUN.2020. BA	Rotating	OEM-SC
1.1	SPCo-SP-0729	42	42A405	Screen pack changers	1. Remove screen changer housing for screw removal. 2. Remove sliders to clean and lubricate. 3. Hydro blast S/C after removal to remove degraded polymer. 4. Replacement of screen elements (independent from shut-down activity). 5. Drain hydraulic fluid from cylinders. 6. Disconnect Hydraulic oil supply and return hoses. 7. Replace hydraulic oil hoses.	Rotating	OEM-SC
1.1	SPCo-SP-0730	42	42T90	SPC/DAV Hydraulic system	Change the Hydraulic oil.	Rotating	OEM-SC
1.1	SPCo-SP-0731	42	42A409	42A409 - Die-plate	To Replace on insulation ring bolts on die plate Replace die-plate	Rotating	OEM-SC

1.1	SPCo-SP-0732	42	42A410	Pelletizer	1. Replace O-Ring at pelletizer water box. 2. Check and repair sealing face of water box. 3. Replace all bearings, seals, and O-rings of the knife shaft bearing assembly. 4. Replace the distance bushing for angular contact bearings on shaft. 5. Knife adjustment: Check hydraulic cylinders for leakage. 6. Replace springs and O-Rings of docking pins. 7. Replace docking pin and docking cylinders on the pelletizer. 8. Check of cardan-shaft for backlash and re-lubrication. If required replace. 9. Replace coupling insert between motor and gearbox. 10. Replace of hydraulic oil filter. 11. Change hydraulic oil. 12. Replace pumps. (Refer to SPCo-SP-2507 and 2508)-to be done by Schem Team 13. Pelletizer movement: Check hydraulic cylinder for leakage: 14. Replace the gearbox bearings and inspect the gears and shafts and replace the seal. 15. Replace the Motor Bearings.	Rotating	OEM-SC
1.1	SPCo-SP-0733	42	42T85	Pelletizer hydraulic oil system	Change the Hydraulic oil.	Rotating	OEM-SC
1.1	SPCo-SP-2485	42	42V80	BCW	To do chemical cleaning. Notification # 11819847	Rotating	OEM-SC
1.1	SPCo-SP-2657	42	42A408	Die Head Housing	1. Remove Die Head Housing 2. Clean (Hydro jetting) and Inspect	Rotating	OEM-SC

1.2	SPCo-SP-0727	42	42A203	Extruder gearbox	1. Remove all gears shafts for bearing replacement and inspection of gears. 2. Check function of lubrication system to bearings and gear. 3. Change oil and filters. 4. Replace superposition drive backstop. 5. Replace all bearings, seals, and rotary union. 6. Verify timing of shafts. 7. Inspect lube oil piping for cracks. 8. NDT shaft and gears. 9. Inspect the Desch coupling 10. Replace Desch coupling bolts 11. Replace Desch coupling flexible elements (buffer) 12. Inspect / replace Friction unit	Rotating	OEM-SC
1.2	SPCo-SP-2882	42	42XM80	Extruder Motor	<u>Solo run the motor and</u> verify magnetic running center of the shaft so placement of the shaft position can be done when coupling to the gear box. <u>Electrical Testing will be carried out by Siemens representative.</u> (This job related to: Rotating) Notification # 11836378	Rotating	OEM-SC
1.3	SPCo-SP-0739	42	42X84	Pellet Dewatering Dryer	Replace the Dryer screens. Replace the Top & bottom Bearings & seals, Replace inlet filter. Inspect sprocket and replace belt.	Rotating	OEM-SC
1.3	SPCo-SP-0740	42	42X85	Pellet Dewatering Dryer	Replace the Dryer screens. Replace the Top & bottom Bearings & seals, Replace inlet filter. Inspect sprocket and replace belt.	Rotating	OEM-SC

Unit 43, LDPE Scope

Line:	Unit 43
Machine:	ZSK 380
Machine no.:	20507540
Project no.:	64020863
SWZ:	21000
MP:	NA
UG:	1000
Polymer	LLDPE
manufactured	2009

**Extruder's System Related- Rotating Scope-
Unit 43**

SOW Doc Ref#	JOB ID	Unit	Tag No	Equipment Name	Scope of Work	Equipment Group	Execution Strategy
2.1	SPCo-SP-0743	43	43V80	Extruder	1. Remove screw shafts for wear measurement. 2. Hydro blast polymer from screw shafts. 3. Unstack screw shaft elements for inspection for wear & Replacement (AWR) as recommended. 4. Verify spare screw timing using roll test before installing in barrels. 5. Clean elements and NDT splines for cracks. 6. Clean and NDT screw shaft for cracks. 7. Hydro blast barrels for inspection. 8. Measure barrel wear using COBRA instrumentation. 9. Replace 7 Barrels barrels & gaskets if required due to polymer leaks. (AWR) 10. Overhaul the screw shaft seal if worn, replace the sealing set. 11. Check all heating and cooling connection piping and valves. 12. Check the instruments, N2 control unit of Mecos seals. 13. Chemical cleaning by Acid flushing all barrel sections. 14. Perform leak test for cooling and heating circuits. 15. Replace Mecos seals. 16. Grease the screw shaft couplings. Note ; Spare Barrel & Elements would be available If barrels would be replaced, then chemical cleaning would be not	Rotating	OEM-SC

					required on old barrel (By other contractor)		
2.1	SPCo-SP-0745	43	43DAV	Extruder Startup valve DAV - 43A404	1. Remove DAV plug and clean excessive polymer leak. 2. Remove DAV/SUV housing for screw removal. 3. Replace hydraulic cylinder. 4. Hydro blast DAV to remove degraded polymer. ----- Check Notification # 11861431 and confirm with Shafi. 15.JUN.2020. BA	Rotating	OEM-SC
2.1	SPCo-SP-0746	43	43A405	Screen pack changers	1. Remove screen changer housing for screw removal. 2. Remove sliders to clean and lubricate. 3. Hydro blast S/C after removal to remove degraded polymer. 4. Replacement of screen elements (independent from shut-down activity). 5. Drain hydraulic fluid from cylinders. 6. Disconnect Hydraulic oil supply and return hoses. 7. Replace hydraulic oil hoses.	Rotating	OEM-SC
2.1	SPCo-SP-0747	43	43T90	SPC/DAV Hydraulic system	Change the Hydraulic oil	Rotating	OEM-SC
2.1	SPCo-SP-0748	43	43A409	43A409 - Die-plate	To Replace on insulation ring bolts on die plate Replace die-plate	Rotating	OEM-SC

2.1	SPCo-SP-0749	43	43A410	Pelletizer	1. Replace O-Ring at pelletizer water box. 2. Check and repair sealing face of water box. 3. Replace all bearings, seals, and O-rings of the knife shaft bearing assembly. 4. Replace the distance bushing for angular contact bearings on shaft. 5. Knife adjustment: Check hydraulic cylinders for leakage. 6. Replace springs and O-Rings of docking pins. 7. Replace docking pin and docking cylinders on the pelletizer. 8. Check of cardan-shaft for backlash and re-lubrication. If required replace. 9. Replace coupling insert between motor and gearbox. 10. Replace of hydraulic oil filter. 11. Change hydraulic oil. 12. Replace pumps. (Refer to SPCo-SP-2511 and 2512)- to be done by Schem Team 13. Pelletizer movement: Check hydraulic cylinder for leakage: 14. Replace the gearbox bearings and inspect the gears and shafts and replace the seal. 15. Replace the Motor Bearings.	Rotating	OEM-SC
2.1	SPCo-SP-0750	43	43T85	Pelletizer hydraulic oil system	Change the Hydraulic oil.	Rotating	OEM-SC
2.1	SPCo-SP-2484	43	43X80	SPC (Screen Pack Changer)	Need to Fix Polymer Leak from Screen Pack Changer Side. Notification # 11819169	Rotating	OEM-SC
2.1	SPCo-SP-2486	43	43V80	BCW	To do chemical cleaning. Notification # 11819888	Rotating	OEM-SC
2.1	SPCo-SP-2658	43	43A408	Die Head Housing	1. Remove Die Head Housing 2. Clean (Hydro jetting) and Inspect	Rotating	OEM-SC

2.2	SPCo-SP-0744	43	43A203	Extruder gearbox	1. Remove all gears shafts for bearing replacement and inspection of gears. 2. Check function of lubrication system to bearings and gear. 3. Change oil and filters. 4. Replace superposition drive backstop. 5. Replace all bearings, seals, and rotary union. 6. Verify timing of shafts. 7. Inspect lube oil piping for cracks. 8. NDT shaft and gears. 9. Inspect the Desch coupling 10. Replace Desch coupling bolts 11. Replace Desch coupling flexible elements (buffer) 12. Inspect / replace Friction unit	Rotating	OEM-SC
2.2	SPCo-SP-2483	43	43X80 - V80	Gearbox	Three bolts on the gearbox need to be repaired. Rotating Reliability engineer and Coperion vendor will have to determine the type of repair necessary. Notification # 11818912	Rotating	OEM-SC
2.2	SPCo-SP-2883	43	43XM80	Extruder Motor	<u>solo run the motor and verify magnetic running center of the shaft so placement of the shaft position can be done when coupling to the gear box. Electrical Testing will be carried out by Siemens representative.</u> (This job related to: Rotating) Notification # 11836379	Rotating	OEM-SC
2.3	SPCo-SP-0756	43	43X84	Pellet Dewatering Dryer	Replace the Dryer screens. Replace the Top & bottom Bearings & seals, Replace inlet filter. Inspect sprocket and replace belt.	Rotating	OEM-SC
2.3	SPCo-SP-0757	43	43X85	Pellet Dewatering Dryer	Replace the Dryer screens. Replace the Top & bottom Bearings & seals, Replace inlet filter. Inspect sprocket and replace belt.	Rotating	OEM-SC

Unit 44, PP Scope

Line:	Unit 44
Machine:	ZSK 350
Machine no.:	20507466
Project no.:	64020861
SWZ:	14000
MP:	NA
UG:	725
Polymer	PP
manufactured	2009

Extruder's System Related- Rotating Scope-
Unit 44

SOW Doc Ref#	JOB ID	Unit	Tag No	Equipment Name	Scope of Work	Equipment Group	Execution Strategy
3.1	SPCo- SP-1806	44	44X80	44V80- Extruder Die Plate (A409)	1. Replace Die Plate 2. Removed die need to send to Coperion WS for overhauling.	Rotating	OEM-SC

3.1	SPCo-SP-1858	44	44A410	44V80- Pelletizer	1. Replace O-Ring at pelletizer water box. 2. Check and repair sealing face of water box. 3. Replace Pelletizer Knife Shaft Assembly with Warehouse stock. 4. Removed Pelletizer Knife Shaft Assembly Need to Be Overhauled (Replace all bearings, seals, and O-rings of the knife shaft bearing assembly, Replace the distance bushing for angular contact bearings on shaft) 5. Knife adjustment: Check hydraulic cylinders for leakage. 6. Replace springs and O-Rings of docking pins. 7. Replace docking pin and docking cylinders on the pelletizer. 8. Check of cardan-shaft for backlash and re-lubrication. If required replace. 9. Replace of hydraulic oil filter. 10. Change hydraulic oil. 11. Pelletizer movement: Check hydraulic cylinder for leakage:	Rotating	OEM-SC
3.1	SPCo-SP-1859	44	44X92	44V80- Throttle Valve	1. Remove DAV plug and clean the excessive polymer leak. 2. Remove DAV/SUV housing for screw removal. 3. Replace hydraulic cylinder. 4. Hydro blast DAV to remove degraded polymer.	Rotating	OEM-SC
3.1	SPCo-SP-1860	44	44X93	44V80- Start Up Valve (DAV)	1. Remove DAV plug to clean the excessive polymer and inspection. 2. Remove DAV/SUV housing for screw removal. 3. Replace hydraulic cylinder soft kits. 4. Hydro blast DAV to remove degraded polymer.	Rotating	OEM-SC

3.1	SPCo- SP-1861	44	44X94A	44V80- Screen Pack Changer A	1. Drain hydraulic fluid from cylinders. 2. Disconnect Hydraulic oil supply and return hoses. 3. Remove screen changer housing for screw removal. 4. Hydro blast S/C after removal to remove degraded polymer. 5. Remove sliders to clean and lubricate 6. Replacement of screen elements 7. Replace hydraulic oil hoses	Rotating	OEM-SC
3.1	SPCo- SP-1862	44	44X94B	44V80- Screen Pack Changer B	1. Drain hydraulic fluid from cylinders. 2. Disconnect Hydraulic oil supply and return hoses. 3. Remove screen changer housing for screw removal. 4. Hydro blast S/C after removal to remove degraded polymer. 5. Remove sliders to clean and lubricate 6. Replacement of screen elements (independent from shut-down activity). 7. Replace hydraulic oil hoses	Rotating	OEM-SC

3.1	SPCo-SP-1864	44	44X80	44V80- Extruder (Zone/Barrels)	1. Disconnect/Connect Barrel Cooling Water (BCW) supply and return connections from/to the barrels. 2. Disconnect/Connect HP steam supply and condensate return connections from/to the barrels. 3. Remove screw shafts for wear measurement. 4. Hydro blast polymer from screw shafts. 5. Unstack screw shaft elements for replacement due to wear. 6. Verify spare screw timing using roll test before installing in barrels. 6a; Screw & Elements would be available for replacement and if required , these would be replaced.(AWR) 7. Clean elements and NDT splines for cracks. 8. Clean and NDT screw shaft for cracks. 9. Remove barrels and Hydro blast for inspection. Kindly confirm whether required leak test for barrel. (It will be evaluated after the barrels inspection as per rotation equipment department comment) 9a. Barrels 2 to 9 is recommended for Replacement. (AWR) 10. Measure barrel wear using COBRA instrumentation. 12. Overhaul the screw shaft seal if worn, replace the sealing set. 13. Replace barrels gaskets. 14. Check all heating and cooling connection piping and valves. 15. Check the instruments, N2 control unit of Mecro seals. 16. Acid (Chemical Cleaning) flush all barrel sections by third party support. (Please refer the line item # SPCo-SP-2651) 17. Replace Mecro seals. 18. Grease the screw shaft couplings.	Rotating	OEM-SC
3.1	SPCo-SP-1865	44	44A408	44V80- Die Head Housing Zone	1. Remove Die Head Housing 2. Inspect and Clean (Hydro jetting)	Rotating	OEM-SC

3.1	SPCo- SP-2618	44	44T85	44V80- Pelletizer Hydraulic Oil Tank	1. Change the Hydraulic oil. 2. Tank Cleaning. 3. Suction screen/ strainer cleaning.	Rotating	OEM-SC
3.1	SPCo- SP-2651	44	44X80	BCW	1. Acid (Chemical Cleaning) flush all barrel sections by third party support. (This line item associated with # SPCo-SP-1864)	Rotating	OEM-SC
3.2	SPCo- SP-1863	44	44A203	44V80- Extruder Gear Box	1. Remove all gears shafts for bearing replacement and inspection of gears. 2. Check function of lubrication system to bearings and gear. 3. Change oil 4. Replace Auxiliary drive backstop. 5. Replace all bearings, seals, and rotary union. 6. Verify timing of shafts. 7. Inspect lube oil piping for cracks. 8. NDT shaft and gears. 9. Inspect the Desch coupling 10. Replace Desch coupling bolts 11. Replace Desch coupling flexible elements (buffer) 12. Inspect / replace Friction unit	Rotating	OEM-SC
3.2	New Job	44	44XM80	Extruder Motor	<u>solo run the motor and</u> verify magnetic running center of the shaft so placement of the shaft position can be done when coupling to the gear box. <u>Electrical Testing will be carried out by Siemens representative.</u> (This job related to: Rotating)	Rotating	OEM-SC

3.3	SPCo- SP-1852	44	44X84	44V84- Pellet Dewatering Dryer	1. Replace the Top & bottom Bearings. 2. Replace the seals, inlet filter 3. Inspect the rotor assembly 4. Replace Belt. 5. Inspect the Sprocket 6. Inspect the screen and replaced if required. (with warehouse stock)	Rotating	OEM-SC
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Task Lists of Various Sub-Assemblies involved in Complete Overhaul of Extruder Machines

In Following section , anticipated maintenance Tasks/activities are listed for each sub-assembly involved in Overall Extruder Overhaul and scope of work of this bid document. These tasks are listed with the purpose to facilitate the bidder to understand detail scope but by no means, it must be assumed that it is covering all requirements of overhaul. Therefore, it must very clear that it does not provide any exemption to contractor for doing any essential activity relevant with the Inspection & overhaul of the machine.

As a representative, Activities against Equipments of Unit 42 units are given below. Being the identical machines & scope similarity , U43 & U44 tasks can be understood accordingly.

Equipment Number: 42V80 /EXTRUDER
Work Order Number: 4267614
Description of Work: Overhauling
WL SR. Number: SPCo-SP-0726
Area: 12
System: EXTRUDER

Sequence Number	Phase P/E/X	Task/Activity Description
1	P	Erect the scaffolding.
2	E	Arrange the material and the spares.
3	E	LTT verification and permit approval.
4	E	Remove all the instruments.
5	E	Breaks loose the screw tips.
6	E	Pull out the screw shafts.
7	E	Isolate steam completely.

8	E	Disconnect all the cooling and steam lines.
9	E	Remove the barrels
10	E	Clean all the head surfaces, flanges & sealing surfaces.
11	E	Hydro blast polymer from screw shafts.
12	E	Unstack screw shaft elements for inspection for wear.
13	E	Clean and NDT screw shaft for cracks.
14	E	Hydro blast barrels for inspection.
15	E	Measure barrel wear using COBRA instrumentation.
16	E	Inspect and Install the barrels
17	E	install the new screw elements into the shaft
18	E	Verify spare screw timing using roll test
19	E	install the screw shaft into the barrels
20	E	Replace the screw shaft sealing set(Meco seals).
21	E	Check all heating and cooling connection piping and valves.

22	E	Perform leak test for cooling and heating circuits.
23	E	Check the instruments, N2 control unit of Mecos seals.
24	E	Grease the screw shaft couplings.
25	E	Connect all the piping to the process section and hopper.
26	E	Re connect all the instruments/electrical connection.
27	E	clean all areas and close permit.

Equipment Number: 42DAV/ Extruder Startup valve DAV - 42A404
Work Order Number: 4267611
Description of Work: OVERHAULING
WL SR. Number: SPCo-SP-0728
Area: 12
System: EXTRUDER

Sequence Number	Phase P/E/X	Task/Activity Description
1	P	Erect the scaffolding.
2	E	Arrange the material and the spares.
3	E	LTT verification and permit approval.
4	E	loose the SPC/SUV flange connection.
5	E	Remove all the hydraulic hoses, Rheometer.

6	E	Rig up the SPC housing and transport to lay down area.
7	E	Hydro jet and clean the SPC housing.
8	E	Remove the safety guard.
9	E	Dis connect the instruments.
10	E	Dis assemble the rack and studs.
11	E	Support the upper slider and pull it out.
12	E	Support the lower slider and pull it out.
13	E	Clean all the internals, dress up the sliders.
14	E	Install the lower slider.
15	E	Install the upper slider.
16	E	Assemble the studs and rack.
17	E	connect the instruments.
18	E	fix back all the hydraulic hoses, Rheometer.
19	E	clean all area and close permit

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Equipment Number: 42A405/ Screen pack changers
Work Order Number: 4267608
Description of Work: Overhauling
WL SR. Number: SPCo-SP-0729
Area: 12
System: Extruder

Sequence Number	Phase P/E/X	Task/Activity Description
1	P	Erect the scaffolding.
2	E	Arrange the material and the spares.
3	E	LTT verification and permit approval.
4	E	Loose the SPC/SUV flange connection.
5	E	Drain hydraulic fluid from cylinders.
6	E	Remove all the hydraulic hoses, Rheometer.
7	E	Rig up the SPC housing and transport to lay down area.
8	E	Hydro jet and clean the SPC housing.
9	E	Remove the safety guard.
10	E	Dis connect the instruments.
11	E	Dis assemble the rack and studs.
12	E	Support the upper slider and pull it out.

13	E	Support the lower slider and pull it out.
14	E	Clean all the internals, dress up the sliders.
15	E	Install the lower slider.
16	E	Install the upper slider.
17	E	Assemble the studs and rack.
18	E	Tighten the piston bolts.
19	E	Replace screen elements
20	E	SPC housing transport to site
20	E	install SPC housing at location
21	E	Replace hydraulic oil hoses.
22	E	Remove LTT
23	E	clean all areas and close permit

Equipment Number: 42T90 / SPC/DAV Hydraulic system
Work Order Number: 4267613
Description of Work: Change the Hydraulic oil.
WL SR. Number: SPCo-SP-0730
Area: 12
System: EXTRUDER

Sequence Number	Phase P/E/X	Task/Activity Description
1	P	Arrange the oil drums at location
2	E	LTT verification and permit approval.
3	E	Drain the Hydraulic oil.

4	E	clean the Tank
5	E	Replace the Hydraulic oil.
6	E	clean all area and close permit

Equipment Number: 42A409 - DIE-PLATE
Work Order Number: 4274065
Description of Work: REPLACE DIE-PLATE
WL SR. Number: SPCo-SP-0731
Area: 12
System: EXTRUDER

Sequence Number	Phase P/E/X	Task/Activity Description
1	P	Erect the scaffolding.
2	E	LTT verification and permit approval.
3	E	Remove Die plate
4	E	Replace new die plate
5	E	clean all areas and close permit

Equipment Number: 42A410 / PELLETIZER
Work Order Number: 4267610
Description of Work: OVERHAULING
WL SR. Number: SPCo-SP-0732
Area: 12
System: EXTRUDER

Sequence Number	Phase P/E/X	Task/Activity Description
1	P	Erect the scaffolding.
2	E	Arrange the material and the spares.
3	E	Dismantle the gear box enclosure.
4	E	LTT verification and permit approval.
5	E	Remove all the instruments.
6	E	Remove the flexi hose...
7	E	Remove the knife shaft bearing assembly.
8	E	Lift up the pelletizer and transport outside.
9	E	Replace gearbox bearings / seals
10	E	Clean all the parts.
11	E	Replace the bearings and assemble.
12	E	Pelletizer trolly transport to site
13	E	Position and fix Pelletizer
14	E	Fix back the flexi hose...

15	E	install all the instruments.
16	E	clean all area and close permit

Equipment Number: 42T85 / Pelletizer hydraulic oil system
Work Order Number: 4267612
Description of Work: Change the Hydraulic oil.
WL SR. Number: SPCo-SP-0733
42
Area:
System: EXTRUDER

Sequence Number	Phase P/E/X	Task/Activity Description
1	P	Arrange the oil drums at location
2	E	LTT verification and permit approval.
3	E	Drain the Hydraulic oil.
4	E	clean the Tank
5	E	Replace the Hydraulic oil.
6	E	clean all area and close permit

Equipment Number: 42A408 -DIE HEAD HOUSING
Work Order Number: 4267609
Description of Work: INSPECTION
WL SR. Number: SPCo-SP-2657
Area: 12

System: EXTRUDER

Sequence Number	Phase P/E/X	Task/Activity Description
1	P	Erect the scaffolding.
2	E	LTT verification and permit approval.
3	E	Remove all the piping on die plate.
4	E	Break loose die head housing, measurement...
5	E	Remove the die head housing.
6	E	clean the die head housing.
7	E	Install die head housing.
8	E	clean all areas and close permit

Equipment Number: 42A203 / GEARBOX
Work Order Number: 4267394
Description of Work: OVERHAULING
WL SR. Number: SPCo-SP-0727
Area: 12
System: EXTRUDER

Sequence Number	Phase P/E/X	Task/Activity Description
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1	P	Erection of the scaffolding.
2	P	Prestaging of the tools and spares.
3	E	Verification of LTT and permit approval.
4	E	Install blinds as per operation blind list
5	E	Drain the lube oil from the gear box.
6	E	Dismantle the back stop and the cover.
7	E	Dismantle the friction part Desch coupling.
8	E	Remove the top covers of the gear box.
9	E	Remove all the lube oil piping.
10	E	Remove all the instruments.
11	E	Dismantle the input shaft bearing.
12	E	Remove the first and second shafts out of the gear box.
13	E	Remove 1701, 1752 & 1802 shafts.
14	E	Clean all the shafts and the gears.
15	E	MPI of the shafts and gears.

16	E	Remove the upper distribution shaft.
17	E	Remove the output shafts. 2303 & 2603.
18	E	Lift out the planetary stage with T2 bearing.
19	E	Lift out the lower distribution shaft.
20	E	Dismantle the lower distribution shaft.
21	E	Dismantle the planetary gear.
22	E	Remove bearings on the shafts.
23	E	Clean all the gears and MPI.
24	E	Install the bottom distribution shaft. (Hydraulic nut).
25	E	Install short output shaft. T8.
26	E	Install planetary stage with T2,Hirth coupling of the long output shaft.
27	E	Install the long output shaft front part.
28	E	Assemble the upper distribution shaft.
29	E	Couple the sun pinion .
30	E	Install the fix speed input shaft.

31	E	Install shaft 1802.
32	E	Install variable speed.
33	E	Install back all the piping.
34	E	Install back all the instruments.
35	E	Install the lubrication pipes.
36	E	Install both the top covers.
37	E	Installation clutch, Coupling the output shaft.
38	E	Filling of lube oil & Start lube oil system.
39	E	Cold alignment.
40	E	Clean all areas & Close the permit.
41	p	Remove the scaffolding.

Equipment Number: 42XM80 / Extruder Motor
Work Order Number: 4235727
Description of Work: Solo Run & Shaft Magnetic Verification
WL SR. Number: SPCo-SP-2882
Area: 12
System: EXTRUDER

Sequence Number	Phase P/E/X	Task/Activity Description
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1	E	Remove LTT and permit approval.
2	E	Deblinding
3	E	Dismantle the scaffolding.
4	E	Clean the area
5	E	Solo run the motor
6	E	couple Motor to the gear box
7	E	verify magnetic running center of the shaft
8	E	close permit.

Equipment Number: 42X84 / PELLET DEWATERING & DRYER
Work Order Number: 4267398
Description of Work: OVERHAULING
WL SR. Number: SPCo-SP-0739
Area: 12
System: EXTRUDER

Sequence Number	Phase P/E/X	Task/Activity Description
1	P	Erect scaffolding.
2	E	Isolate the dryer.

3	E	LTT verification and permit approval.
4	E	Open the dryer access door & clean thoroughly.
5	E	Remove the screens and clean thoroughly.
6	E	Support the rotor.
7	E	Remove the drive guard.
8	E	Remove the rotor sheeve.
9	E	Remove the upper bearing
10	E	Install the new bearing.
11	E	Sqare the bearing holding flange.
12	E	Remove the bottom bearing and seal.
13	E	Install the bottom bearing and seal.
14	E	Install the screens.
15	E	Secure the splash guard and the access door.
16	E	Install the rotor sheeve.

17	E	Install the new belts and tension the belts.
18	E	Fix back the motor base and the guard.
19	E	Replace the air filter.
20	E	Clean the area and close the permit.
21	E	Remove the scaffolding.

Equipment Number: 42X85 / PELLET DEWATERING & DRYER
Work Order Number: 4267599
Description of Work: OVERHAULING
WL SR. Number: SPCo-SP-0740
Area: 12
System: EXTRUDER

Sequence Number	Phase P/E/X	Task/Activity Description
1	P	Erect scaffolding.
2	E	Isolate the dryer. LTT.
3	E	LOTO verification and permit approval.
4	E	Open the dryer access door & clean thoroughly.
5	E	Remove the screens and clean thoroughly.
6	E	Support the rotor.

7	E	Remove the drive guard.
8	E	Remove the rotor sheeve.
9	E	Remove the upper bearing
10	E	Install the new bearing.
11	E	Align the bearing holding flange.
12	E	Remove the bottom bearing and seal.
13	E	Install the bottom bearing and seal.
14	E	Install the screens.
15	E	Secure the splash guard and the access door.
16	E	Install the rotor sheeve.
17	E	Install the new belts and tension the belts.
18	E	Fix back the motor base and the guard.
19	E	Replace the air filter.

20	E	Clean the area and close the permit.
22	X	Remove the scaffolding.

Sub-Section-3; Timelines (Available Maintenance Windows)

Maintenance window as per L-2

- Available maintenance window to perform all Inspection & overhaul activity is 31 days for Each unit.
 - Unit 42; will be handed over for maintenance on 4th day of decommissioning
 - Unit 43; will be handed over for maintenance on 4th day of decommissioning
 - Unit44 ; will be handed over for maintenance on 4th day of decommissioning

Note ; However, this 31-day window is the Maximum available limit. It is desired that contractor must suggest & devise a plan to finish the work well before with in this maximum available time , in order to have sufficient cushion for verification & re-testing and to encounter any contingency.

In Detailed Planning phase , Schem may review the system's handing over dates and schedule will be accordingly updated.

It is also note-worthy that it is a level 2 plan and parallel activities has not yet integrated. In detail planning phase TA with engagement of OEM & contractor's planning team's support will integrate detailed schedule for best possible scenarios.

Some Key aspects to be Noted;

- For Each Unit , after dismantling of process section parts , BCW piping will go under chemical cleaning. *By Separate contractor*
- For Each Unit after dismantling of Process section parts , Steam circuit spools would be dismantled , sent to temporary workshop at site, valves would be replaced and returned to site and spools refitted again. *By Separate contractor*
- So, while performing above jobs , area around screw & barrel would not be available for rotary contractor. However, Gear box end , Tail end would be available.

These jobs have been explained separately for further understanding on schedule impact in section-6 below.

- Providing a detailed T/A schedule in P6 showing start date, detailed sequence of activities, end date, crew sizes and craft mix. Schedule can be later on improved during TA detailed planning phase , Keeping in view the work density & parallel works in Finishing buildings(Extruder's Buildings).
- All work is to be planned and scheduled to complete as soon as possible
- Contractors shall submit the TA & Industrial Experience certificate for Extruder's works.
- Contractors will submit Method statement with technical bid, which can be further modified / updated after award of contract & necessary review from COMPANY's technical team.
- Contractor shall provide TA Org Chart & Manpower Loading , Equipment Manpower Chart , CV's of Supervisors who will look after the extruder Works.
- Responsibility Matrix ; Contractor will also provide the information about Support ,Tools, Manpower & equipment Resources , for which contractor will take the responsibility and what is required from Schem or Schem's Subcontractor

Sub-Section-5

; Parallel Scopes (Extruder Building Jobs to be carried out independently by Schem or Schem's contractor, Not part of this scope)

Purpose of this section is to identify the possible holdups, slowdowns , distractions resulted from the parallel works in close proximity on the same system which may not be the direct responsibility of the OEM & overhaul team for Rotary works at Extruder, But still being the essential part of maintenance scope for extruder in TA duration , these jobs has to be attended. It will not only enlighten about areas of interfaces & coordination among various stake holders but also will explicate the work density around the area. We have filtered out those tasks which will be carried out in premises of Finishing building and will have some kind of interface , dependency, or association with Extruder Rotary overhaul. Responsibility of these parallel works would though be bestowed to other contractors or Schem's own maintenance teams , But to ensure a smooth transition , schedule integration , and frictionless interface among multi performing groups , this factor should be measured , assessed and accommodated in calculation of schedule & resources so that target scope can be accomplished safely & timely without any compromise over quality and without any masked surprises.

In our scope review discussions in Pre-Bid phase , TA planning team already have explained this aspect in detail to draw attention on the scope density around extruder machine by different work groups. , so that while working on schedule & resource estimations , contractor can clearly classify high , medium or low interface areas. It will ensure, that the aspect of accommodating and provision of necessary maintenance window to different parallel work group activities don't get neglected.

Some typical examples (detail list also provided in later part of this section) of interface are as under.

- Main Motor swapping activities & Solo Run
- Exchangers cleanings & pressure tests in extruder system in finishing buildings
- Drums Inspections

- Chemical cleaning of BCW
- Replacement of Valves & steam traps in steam & condensate system around Barrel & screw section

Total Summary of Parallel Jobs in Finishing Building Around Extruder Overhaul Works

Work Category	Equipment Type	42	43	44	Total	Nature of Work
Fixed Equipment	Exchanger	5	5	5	15	Bundle Pulls, Tubes NDT, Pressure Test
	Drum	5	5	5	15	Cleaning, Inspection, NDTs
	Piping	3	3	3	6	Replacement of Valves & Steam Traps-Steam & condensate System, Chemical cleaning BCW Loop (Hot Works- Approx. 75 jobs each unit)
	Sub-Total-Fixed	13	13	13	39	
Instrument Works	Sub-Total-Instruments	1	1	3	5	Level Switches, Miscellaneous SIS
Electrical Works	Electrical System	2	2	0	4	Exciter Panels Inspection & overhaul
	Motor	7	7	6	20	Dismantling, Reinstallation after Overhaul, Electrical testing & alignments
	Sub-Total-Electrical	9	9	6	24	
All Parallel works In Finishing Building Ground Floor		23	23	22	68	

Parallel Scope To be Carried out In Extruder Building by Schem's Other Contractors

Extruder Systems- Parallel Fixed Equipment scope, Piping Work , Drums , Exchangers Inspections etc.

*Location	FB (Finishing Building Ground Floor)
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Total

Jobs 39

Serial Number	Unit	Tag No	Equipment Name	Equipment Group	Equipment Type	Execution Strategy	*Location	Interface nature & Misc. Remarks
SPCo-SP-0008	44	44X80	44V80-Extruder	Fixed	Piping	MN-SC	FB	Isolation Valves & Steam Traps Replacement of HP/Condensate System- Piping & Hot work
SPCo-SP-0009	44	44X80	44V80-Extruder	Fixed	Piping	MN-SC	FB	Inspect & Clean All Strainers in HP steam system
SPCo-SP-0049	42	42X80	Extruder Zones HP Steam	Fixed	Piping	MN-SC	FB	Steam/Condensate Valves Replacements- Barrel Zone- Hot Works
SPCo-SP-0050	43	43X80	Extruder	Fixed	Piping	MN-SC	FB	Steam/Condensate Valves Replacements- Barrel Zone- Hot Works
SPCo-SP-0076	42	42T85	Die Plate Hydraulic Oil Reservoir	Fixed	Drum	MN-SC	FB	Vessel Cleaning, Inspection & NDT
SPCo-SP-0077	42	42T90	SPC Hydraulic Oil Tank	Fixed	Drum	MN-SC	FB	Vessel Cleaning, Inspection & NDT
SPCo-SP-0081	43	43T81	Main Motor LO Reservoir (Extruder)	Fixed	Drum	MN-SC	FB	Vessel Cleaning, Inspection & NDT
SPCo-SP-0082	43	43T85	Die Plate Hydraulic Oil Reservoir	Fixed	Drum	MN-SC	FB	Vessel Cleaning, Inspection & NDT
SPCo-SP-0083	43	43T90	Hydraulic Oil Tank (Extruder)	Fixed	Drum	MN-SC	FB	Vessel Cleaning, Inspection & NDT
SPCo-SP-0099	42	42D80	Extruder Feed Hopper	Fixed	Drum	MN-SC	FB	Vessel Cleaning, Inspection & NDT
SPCo-SP-0100	42	42D84	Barrel Cooling Water Drum (Extruder)	Fixed	Drum	MN-SC	FB	Vessel Cleaning, Inspection & NDT
SPCo-SP-0110	42	42E87	Barrel Cooling Water Cooler (Extruder)	Fixed	Exchanger	MN-SC	FB	Bundle Pull Out, Chemical Cleaning, NDT of Tubes, Pressure Testing

SPCo-SP-0140	43	43D80	Extruder Feed Hopper	Fixed	Drum	MN-SC	FB	Vessel Cleaning, Inspection & NDT
SPCo-SP-0141	43	43D84	Barrel Cooling Water Drum (Extruder)	Fixed	Drum	MN-SC	FB	Vessel Cleaning, Inspection & NDT
SPCo-SP-0171	42	42T81	Main Motor LO Reservoir	Fixed	Drum	MN-SC	FB	Vessel Cleaning, Inspection & NDT
SPCo-SP-0213	42	42E82	Main Motor LO Cooler (Extruder)	Fixed	Exchange r	MN-SC	FB	Hydro jetting, NDT of Tubes, Pressure Testing
SPCo-SP-0214	42	42E84	Gearbox LO Cooler (Extruder)	Fixed	Exchange r	MN-SC	FB	Bundle Pull Out, Chemical Cleaning, NDT of Tubes, Pressure Testing
SPCo-SP-0215	42	42E85	Main Motor Cooler (Extruder)	Fixed	Exchange r	MN-SC	FB	Air Cleaning of Tubes, NDT of tubes, Pressure Testing
SPCo-SP-0216	42	42E86	Supplementa ry Motor Cooler (Superpositio n)	Fixed	Exchange r	MN-SC	FB	Bundle Pull Out, NDT of Tubes, Pressure Testing
SPCo-SP-0236	43	43E82	Main Motor LO Cooler (Extruder)	Fixed	Exchange r	MN-SC	FB	Bundle Pull Out, NDT of Tubes, Pressure Testing
SPCo-SP-0237	43	43E84	Gearbox LO Cooler (Extruder)	Fixed	Exchange r	MN-SC	FB	Bundle Pull Out, Chemical Cleaning, NDT of Tubes, Pressure Testing
SPCo-SP-0238	43	43E85	Main Motor Cooler (Extruder)	Fixed	Exchange r	MN-SC	FB	Air Cleaning of Tubes, NDT of tubes, Pressure Testing
SPCo-SP-0239	43	43E86	Supplementa ry Motor Cooler (Extruder)	Fixed	Exchange r	MN-SC	FB	Bundle Pull Out, NDT of Tubes, Pressure Testing
SPCo-SP-0242	43	43E87	Barrel Cooling Water Cooler (Extruder)	Fixed	Exchange r	MN-SC	FB	Bundle Pull Out, Chemical Cleaning, NDT of Tubes, Pressure Testing
SPCo-SP-0296	44	44D80	44V80- Extruder Feed Hopper	Fixed	Drum	MN-SC	FB	Vessel Cleaning, Inspection & NDT
SPCo-SP-0297	44	44D84	44V80- Barrel Cooling Water Drum	Fixed	Drum	MN-SC	FB	Vessel Cleaning, Inspection & NDT
SPCo-SP-0302	44	44E86	44V80- Die Plate Knife Hydraulic Oil Pump Cooler	Fixed	Exchange r	MN-SC	FB	Air Cleaning of Tubes, NDT of tubes, Pressure Testing
SPCo-SP-1641	44	44E87	44V80- Barrel Cooling Water Cooler	Fixed	Exchange r	MN-SC	FB	Hydro jetting, NDT of Tubes, Pressure Testing

SPCo-SP-1644	44	44T81	44V80- Main Motor LO Reservoir	Fixed	Drum	MN-SC	FB	Vessel Cleaning, Inspection & NDT
SPCo-SP-1645	44	44T85	44V80- Pelletizer Hydraulic Oil Tank	Fixed	Drum	MN-SC	FB	Vessel Cleaning, Inspection & NDT
SPCo-SP-1646	44	44T87	44V80E- Hydraulic Oil Tank	Fixed	Drum	MN-SC	FB	Vessel Cleaning, Inspection & NDT
SPCo-SP-1687	44	44E81	44V80- Main Motor LO Heater (Extruder)	Fixed	Exchange r	MN-SC	FB	Bundle Pull Out, NDT of Tubes, Pressure Testing
SPCo-SP-1688	44	44E84	44V80- Gearbox LO Cooler (Extruder)	Fixed	Exchange r	MN-SC	FB	Bundle Pull Out, NDT of Tubes, Pressure Testing
SPCo-SP-1689	44	44E85	44V80- Main Motor Cooler (Extruder)	Fixed	Exchange r	MN-SC	FB	Air Cleaning of Tubes, NDT of tubes, Pressure Testing
SPCo-SP-2488	42	42X80	Steam Traps	Fixed	Piping	MN-SC	FB	Steam/Condensate Valves Replacements- Barrel Zone- Hot Works
SPCo-SP-2489	43	43X80	Steam Traps	Fixed	Piping	MN-SC	FB	Steam/Condensate Valves Replacements- Barrel Zone- Hot Works
SPCo-SP-2485	42	42V80	BCW	Fixed	Piping	MN-SC	FB	Chemical cleaning of BCW loop
SPCo-SP-2651	44	44X80	BCW	Fixed	Piping	MN-SC	FB	Chemical cleaning of BCW loop
SPCo-SP-2965	43	43V80	BCW	Fixed	Piping	MN-SC	FB	Chemical cleaning of BCW loop

Extruder System- Parallel

Instrument Scope

Total Jobs 5

*Location	FB (Finishing Building Ground Floor)
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Serial Number	Unit	Operations Work Group	System	Tag No	Equipment Name	Location	Interface nature & Misc. Remarks
SPCo-SP-1085	42	PE	EXTRUDER	42LSL08621	Gear ZSK Oil Sump Level	FB	Level Switch Replacement in Gear Box
SPCo-SP-1964	43	PE	EXTRUDER	43LSL08621	Gear ZSK Oil Sump Level	FB	Level Switch Replacement in Gear Box

SPCo-SP-2021	44	PP	EXTRUDER MAIN DRIVE	44LG-08620	44V80-Extruder Gearbox lube oil level gauge	FB	Magnetic Level Gauge Replacement-Gear Box
SPCo-SP-2452	44	PP	EXTRUDER MAIN DRIVE	44A203	44V80-Extruder Gear Box	FB	Calibration of Level Switches, SIS Interlock Instrumentation Works
SPCo-SP-2659	44	PP	EXTRUDER MAIN DRIVE	44LSL08621	Extruder gearbox	FB	Level Switch Replacement in Gear Box

Extruder System-Parallel Electrical Works

Total Jobs 24

								*Location	FB (Finishing Building Ground Floor)
Serial Number	Unit	Tag No	Equipment Name	Nature of Work /Job Title	Equipment Type	Work Group	Execution Owner	Location	Interface nature & Misc. Remarks
SPCo-SP-0109	42	42E81	Main Motor LO Heater	Inspection	Electrical System	TA	Maintenance	FB	Inspection & Testing of Electrical Heaters
SPCo-SP-0899	42	42E88	HOT OIL HEATER	Inspection	Electrical System	TA	Maintenance	FB	Inspection & Testing of Electrical Heaters
SPCo-SP-0736	42	42XM80-1	Extruder main motor	Major Overhaul	Motor	TA	Maintenance	FB	Motors Dismantling, Reinstallation, Electrical Testing
SPCo-SP-0738	42	42XM80-3	Extruder Pelletizer motor	Major Overhaul	Motor	TA	Maintenance	FB	Motors Dismantling, Reinstallation, Electrical Testing
SPCo-SP-0960	42	42XM80-2	Extruder Superposition motor	Major Overhaul	Motor	TA	Maintenance	FB	Motors Dismantling, Reinstallation, Electrical Testing

SPCo-SP-2509	42	42P M85	DIE PLATE HYDRA ULIC OIL PUMP Motor	Mino r Over haul	Moto r	TA	Maint enanc e	FB	Motors Dismantling, Reinstallation, Electrical Testing
SPCo-SP-2510	42	42P M86	DIE PLATE KNIFE HYDRA ULIC OIL PUMP Motor	Mino r Over haul	Moto r	TA	Maint enanc e	FB	Motors Dismantling, Reinstallation, Electrical Testing
SPCo-SP-2516	42	42P M90	SPC/D AV HYDRA ULIC OIL PUMP Motor	Mino r Over haul	Moto r	TA	Maint enanc e	FB	Motors Dismantling, Reinstallation, Electrical Testing
SPCo-SP-2720	42	42X M80 -1EX	42V80- EXTRU DER MAIN DRIVE MOTO R EXCITE R PANEL	Mino r Over haul	Moto r	TA	Maint enanc e	FB	Exciter Panel Works- Inspection, Testing & Overhaul
SPCo-SP-0161	43	43E 81	Main Motor LO Heater (Extrud er)	Inspe ction	Electr ical Syste m	TA	Maint enanc e	FB	Inspection & Testing of Electrical Heaters
SPCo-SP-2615	43	43E 88	HOT OIL HEATE R	Inspe ction	Electr ical Syste m	TA	Maint enanc e	FB	Inspection & Testing of Electrical Heaters
SPCo-SP-0753	43	43X M80 -1	Extrud er main motor	Majo r Over haul	Moto r	TA	Maint enanc e	FB	New Motor Installation, Dismantling, Reinstallation, Electrical Testing
SPCo-SP-0754	43	43X M80 -2	Extrud er Superp osition motor	Majo r Over haul	Moto r	TA	Maint enanc e	FB	Motors Dismantling, Reinstallation, Electrical Testing

SPCo-SP-0755	43	43X M80 -3	Extruder Pelletizer motor	Major Overhaul	Motor	TA	Maintenance	FB	Motors Dismantling, Reinstallation, Electrical Testing
SPCo-SP-2513	43	43P M85	DIE PLATE HYDRAULIC OIL PUMP Motor	Minor Overhaul	Motor	TA	Maintenance	FB	Motors Dismantling, Reinstallation, Electrical Testing
SPCo-SP-2514	43	43P M86	DIE PLATE KNIFE HYDRAULIC OIL PUMP Motor	Minor Overhaul	Motor	TA	Maintenance	FB	Motors Dismantling, Reinstallation, Electrical Testing
SPCo-SP-2518	43	43P M90	SPC/DAV HYDRAULIC OIL PUMP Motor	Minor Overhaul	Motor	TA	Maintenance	FB	Motors Dismantling, Reinstallation, Electrical Testing
SPCo-SP-2721	43	43X M80 -1EX	43V80-EXTRUDER MAIN DRIVE MOTOR EXCITER PANEL	Minor Overhaul	Motor	TA	Maintenance	FB	Exciter Panel Works- Inspection, Testing & Overhaul
SPCo-SP-1732	44	44X M80 -3	44V80-Pelletizer MOTOR 44XM80-3	Major Overhaul	Motor	TA	Maintenance	FB	Motors Dismantling, Reinstallation, Electrical Testing
SPCo-SP-1733	44	44X M80 -1	44V80-EXTRUDER MAIN DRIVE MOTOR 44XM8	Major overhaul	Motor	TA	Maintenance	FB	Motors Dismantling, Reinstallation, Electrical Testing

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SPCo-SP-1857	44	44X M80 -2	44V80- Auxilia ry drive	Mino r Over haul	Moto r	TA	Maint enanc e	FB	Motors Dismantling , Reinstallation , Electrical Testing
SPCo-SP-2448	44	44P M85	44V80- Die Plate Hydrau lic Pump Motor	Mino r Over haul	Moto r	TA	Maint enanc e	FB	Motors Dismantling , Reinstallation , Electrical Testing
SPCo-SP-2450	44	44P M86	44V80- Die Plate Knife Hydrau lic Pump Motor	Mino r Over haul	Moto r	TA	Maint enanc e	FB	Motors Dismantling , Reinstallation , Electrical Testing
SPCo-SP-2498	44	44X M80 -1EX	44V80- EXTRU DER MAIN DRIVE MOTO R EXCITE R PANEL	Mino r Over haul	Moto r	TA	Maint enanc e	FB	Exciter Panel Works- Inspection, Testing & Overhaul

SECTION –B

SCOPE SPECIFIC AND GENERAL

TERMS & CONDITIONS

1. CONTRACTOR'S RESPONSIBILITIES, TERMS & CONDITION SECTION

The Scope of work described in this document shall be executed in accordance with the following terms and conditions , wherever it applicable to the subject job. Terms & conditions with respect to contractor's responsibilities have been listed in below documents under different sub-heads.

As a guiding document for proposal please go through following paragraphs addressing the division of responsibilities between contractor's & Schem.

CONTRACTOR's responsibilities include, but are not limited to the following:

a. General Instructions;

- 1) CONTRACTOR shall perform safe and timely execution of all work activities described in" CONTRACTOR's Scope".
- 2) Work performed by CONTRACTOR will be under the direction of "COMPANY"/ Cpchem supervision or Company's engaged specialists(OEM). As necessary, additional support or direction can be obtained from the Area Supervisor-in-charge assigned by "COMPANY".
- 3) CONTRACTOR shall comply with COMPANY's all General Instructions (GI) and Best Practices related to the scope of work. Copies of COMPANY General Instructions will be provided.
- 4) Supplying all qualified labor, supervision, tools, equipment, Cranes , alignment tools , technical support, consumables, expendables, and temporary supplies necessary for, and reasonably related to complete Extruder work.
- 5) Providing necessary consumable and expendable supplies in enough quality and quantity for personnel to perform the scope of work safely and efficiently.
- 6) All necessary cleaning tools, "COMPANY" approved sprays & chemicals would be contractor's responsibility.
- 7) Contractor shall perform the work on both Day & Night Shifts. Each Working Shift shall be of 12 Hours.
- 8) Contractor to ensure the shift turnover for critical and near critical path Equipment to be done at site
- 9) Providing necessary cranes, safety gears, steam & portable compressors along with relevant crews, where over required.
- 10) Contractor shall follow "COMPANY" HR Fatigue Policy CP # 1055. Contractor shall mobilize the personnel under their direction to comply with this policy to ensure personnel physical health without negatively affecting TA schedule or quality
- 11) Contractor will be responsible for Transport, Food, Tea or Water for his staff. Company will allocate the Tent Area for Lunch or Dinner

b. Actions required After PO Issuance;

- 12) Submit the Organization chart, defined by craft and name, all personnel required to execute and supervise the scope of work, 45 days in advance of the T/A start date as defined by "COMPANY" T/A management. CONTRACTOR will schedule personnel for required pre-T/A training at the request and timing specified by "COMPANY" T/A management and "COMPANY" Safety.

- 13) After issuance of PO, contractor will be responsible to submit project manager & planning team names who will be involved with "COMPANY"'s TA planning team for joint site visits & any exchange of information. Contractor's planning team will be responsible for submitting the Lifting plans, method statements during Planning phase. This Planning team who is involved in Planning phase will not be removed or change in execution stage.
- 14) Support TA planning in detail Planning phase for L-5 Schedule preparation with built in margins of parallel scopes, identification of special Tools & resources , any prefabrication activities or pre-inspection of spares.
- 15) Support TA team to identify the resource & tools requirements from site sub-contractors in terms of manpower , craft specialties , tools , mobile Equipments
- 16) Contractors will submit QA/QC plan highlighting the hold points, method statement & P6 schedule with technical bid, which can be further modified / updated after award of contract.
- 17) Contractor will arrange receipt and transfer of all non-consumable material from the "COMPANY" T/A Warehouse to the work location. CONTRACTOR will return the balance of unused and undamaged material to the T/A warehouse after completion of work.
- 18) All tools, equipment, and resources are subject to initial and periodic inspection by "COMPANY" personnel to ensure safe and compliant use within the "COMPANY" facility. "COMPANY" reserves the right to reject use of any tool(s) or equipment for cause. Tool container shall be provided by Contractor.
- 19) Contractor shall send their Admin Co-coordinator (Arabic) for coordination with Company's Admin & Security Department for preparation of ID's etc., as and when required.
- 20) Contractor will get approved Torque value charts equipment wise from COMPANY's reliability and provide copy to TA Planning during planning phase, FORTY-FIVE (45) days prior to turnaround.

c. **Work Specific Instructions**

- 21) Contractor's will prepare the equipment for any NDT inspection up to the satisfaction level of reliability, will coordinate with reliability for inspection and will repair in accordance with the reliability's recommendation.
- 22) Contractors will make necessary safety arrangements & hard barricades in staging & work area.
- 23) Special precautions have to be taken to avoid water usage where no hydro blasting or water cleaning is required. Only manual cleaning would be done. Special Alerts would be placed by contractor on such jobs
- 24) Contractor will be responsible for all site coordination with Planning, Operation, Process & reliability as & when necessary to make sure that there is no lag time in between activities.
- 25) Contractor will inform the requirement of workshop facility, if required in planning phase.
- 26) Contractor will arrange all consumables , cleaning agents.
- 27) Keeping in view the nature of Work contractor will bring Bearing Heaters , Demagnetization arrangement , in case bearings get magnetized.

- 28) As Process section , Gear Box section and other accessories are heavy parts , Contractor will arrange special experienced rigging team, all packing/temporary supports to be placed under dismantled parts ground to safeguard against dirt & scratches.
- 29) Contractor will inform about the requirement of site area for placing the spares in racks, repair of gear box etc.
- 30) Contractor will be responsible to plan the job and will also let Schem know about the preparatory work required in pre-TA.
- 31) In Case , if there are multiple contractors to work on the same equipment in between its own activity before final hydrotest or box up , like for parallel fixed Equipments inspections , tube cleanings , Valves & Steam traps Replacements on steam circuit works , BCW chemical cleaning , on surrounding steam & condensate systems , , Contractor will be responsible to ensure effective communication , accommodation and follow up with that contractor to ensure that no unnecessary lag occur in this interface and transition.
- 32) Contractor will arrange all measurement tools to record clearances & wear measurements. Contractor will be responsible for COBRA measurement tools.
- 33) Contractor will get the final box up certificate after completion of all activities. All this box up certificates will be handed over to TA planning.
- 34) Inspection & verification of all the tools & spares in advance of T.A to ensure everything is set up to meet the needs of overhaul scope.
- 35) All tools, equipment, and resources are subject to initial and periodic inspection by COMPANY personnel to ensure safe and compliant use within the COMPANY facility. COMPANY reserves the right to reject use of any tool(s) or equipment for cause.

d. **Attachments essential with Technical Proposal**

- 36) Providing a detailed T/A schedule in P6 showing start date, detailed sequence of activities, end date, crew sizes and craft mix. Schedule can be later on improved during TA detailed planning phase , Keeping in view the work density & parallel works in Finishing buildings(Extruder's Buildings).
- 37) All work is to be planned and scheduled to complete as soon as possible
- 38) Contractors shall submit the TA & Industrial Experience certificate for Extruder's works.
- 39) Contractors will submit Method statement with technical bid, which can be further modified / updated after award of contract & necessary review from COMPANY's technical team.
- 40) Contractor shall provide TA Org Chart & Manpower Loading , Equipment Manpower Chart , CV's of Supervisors who will look after the extruder Works.

- 41) Responsibility Matrix ; Contractor will also provide the information about Support ,Tools, Manpower & equipment Resources , for which contractor will take the responsibility and what is required from Schem or Schem's Subcontractor

e. **Safety Instructions**

- 42) Providing full time Safety personnel whose sole responsibility shall be to ensure CONTRACTOR personnel conduct work in accordance with Rules and Regulations of "COMPANY", and that good safe work practices are utilized at all times.
- 43) Performing work in accordance with "COMPANY" Safety procedures and requirements outlined in the "COMPANY" T/A EH&S Plan and compliance to all "COMPANY" General Instructions (GI). Copies of "COMPANY" General Instructions will be provided.
- 44) Contractor shall provide a well-trained & certified Permit receiver, Hole watch, fire watch & bottle watch.
- 45) Contractors will be responsible for all PPE's for his manpower.
- 46) Contractor will make sure that any of his labor does not exceed 16 hrs. of continuous work. Also, at every 14th day, each labor has to be given a one-day rest.
- 47) Safety officer's final acceptance will be after face to face interview with "COMPANY" safety department.

f. **Planning & monitoring**

- 48) Visiting the job site to acquaint themselves with existing conditions.
- 49) Contractor's Site management staff , Equipment and Leadership team like Supervisors/Foremen/Leads, Lead Planner QA/QC, etc. shall comply to the "COMPANY" plan for early mobilization as specified for necessary preparation work to understand the job , for site orientation , Crew's planning as per P6 schedule , JSA's , detailed assessment of work requirements , equipment & staff certifications and for setting up agreed temporary installations.
- 50) Prestaging activity to be started 3 weeks in advance.
- 51) CONTRACTOR shall mobilize the leadership team Fifteen (15) days ahead of start of S/D start date However, in detail Planning phase whatever the date & strength is agreed & approved by TA Planning Superintendent or TA Manager, would be required to be mobilized according to Final L-4 schedule.
- 52) Contractors will submit daily progress report to TA planning, highlighting the work activities of the day, next day plan, equipment & manpower count, HSE statistics of the site. CONTRACTOR will also issue daily work schedule based on two shifts of 12 hours each
- 53) Contractor shall provide the On-Site Peak load & Org Chart with their technical manpower also on daily progress report.
- 54) CONTRACTOR Shall ensure the shift relieving to be done at job site for critical path equipment's.
- 55) At the end of the TA activity, a detailed report shall be submitted to Company by Contractor. Contractor's Final invoices will be approved on submission of consolidated dossier of NDT reports & Activity Report along with lesson learnt.

g. **Handling of Additional & Discovery Work**

- 56) Contractor to mobilize sufficient resources like Extruders specialists , shift supervisors , technicians, tools & equipment to support operations in Decommissioning & Startup phase till Feed In. Manpower mobilization for this crew shall be applicable as part of lumpsum cost and will be applicable from Shutdown start date. However, for any early support activity for operations, contractor will ensure early mobilization of the required crafts & resources as demanded. Operation support requirements for Shutdown period and before or after Shutdown period will be evaluated in Pre-TA phase. Any Additional support outside the TA window will be paid separately on Day rate Basis.
- 57) For any additional work, please provide us unit rates for manpower craft wise and for all the Equipments like cranes, lift trucks, hydro jetting m/c, pressure testing pumps, bundle pullers etc.
- 58) Any discovery work shall be invoiced separately and shall be based on "COMPANY" approved CMF form.

h. **Restricted Access - Avoid Unnecessary Movement**

- 59) Advising and warning CONTRACTOR personnel that Operations Central Control Rooms and other Operations Structures within the "COMPANY" facility are not to be entered or accessed FOR ANY REASON without operations approval and escort. Any unescorted CONTRACTOR found inside a Central Control Room or other Operations Structure is subject to removal and banishment from the "COMPANY" work site.
- 60) Advising and warning CONTRACTOR personnel that the Central Maintenance Shops and Maintenance Structures within the "COMPANY" facility are not to be entered or accessed FOR ANY REASON without maintenance approval and escort. Any unescorted CONTRACTOR found inside a Maintenance Shop or other Maintenance Structure is subject to removal and banishment from the "COMPANY" work site.
- 61) CONTRACTOR shall ensure presence of their personnel to the designated work area only. Any Person found in or around unrelated plant area, shall be subject to immediate removal from Plant. CONTRACTOR shall provide a suitable replacement immediately to avoid any effect on work progress.

i. **House Keeping**

- 62) Maintaining a job site that is clean and free of debris at all times. After completion of work, leave the area as clean as found.
- 63) Discarding all coke, sludge, damaged parts, packing/ scrap metals, and all other general rubbish from maintenance activities into designated waste containers provided by COMPANY. The CONTRACTOR shall make arrangements to shift waste containers to temporary waste storage areas designated by COMPANY.

2. SCHEM IS RESPONSIBLE FOR:

- a) Isolation and Decontamination of Equipment/system.
- b) Electrical & Instrument disconnections

- c) System Blinding which or Common Blinding for jobs which have interface with other Contractor's scope.
- d) Any Insulation & Refractory removal , repair or Installation activity
- e) All sort of Painting work.
- f) Any type of hot work involving cutting, grinding & welding as recommended by reliability & inspection team.
- g) Erection of all scaffolds and revisions as required by CONTRACTOR
- h) Provide drawings, blinds, gaskets, spares or any other materials and consumables required to facilitate the subject job.
- i) Provide utilities such as water, lights for internal and external use.
- j) Scaffolding, Insulation and any type of welding and grinding works recommended by Inspection team or OEM.
- k) Office facilities for CONTRACTOR (as decided by Schem T/A management, either Blast Resistant Module for essential on-site personnel, or workspace in the T/A office for non-essential personnel)
- l) All NDT Inspections like verification of work quality and final approval of cleaning & repair work.
- m) Tent with tables and chairs for CONTRACTOR lunch and rest break
- n) Prayer facilities in designated work locations
- o) Drinking water around the clock
- p) All temporary lighting for confined space entry (IF required by GI, Class-1 Div-1)
- q) All EHS meters and monitors required by General Instruction
- r) Rest Shelters in designated work locations
- s) Smoke Shelters in designated work locations
- t) Sanitary facilities (toilets and hand wash stations)
- u) All non-consumable material required to perform the scope of work
- v) Making Extruders ready to blind

3. DRAWINGS, SPECIFICATIONS & PROCEDURES

Specifications, standards, procedures, drawings and Company's General Instructions shall apply to Engineering and construction works when applicable. All above documents shall be collected from Turnaround Planning Section.

4. GUIDELINES

- 4.1 All work should follow COMPANY Standards and Specifications.
- 4.2 All work outside the above codes, standards and specifications shall follow COMPANY guidelines and practices.
- 4.3 CONTRACTOR shall comply with COMPANY Policies, General Instructions and Work Procedures regarding the use of Personal Protective Equipment's (PPE).
- 4.4 CONTRACTOR shall comply with COMPANY Safety and Security program Exhibit III (more details can be sought out later by CONTRACTOR as applicable)

- 4.5 COMPANY may from time to time and at any time require CONTRACTOR to suspend performance hereunder completely or partially for whatever length of time COMPANY may elect. The time for completion shall be extended by each period that the completion date is necessarily delayed by (a) the actions or omissions of COMPANY or another independent contractor that is directly responsible to COMPANY (unless such delay is due to CONTRACTOR's actions or failures to act). In case COMPANY requires suspending the performance of work, CONTRACTOR shall be given reasonable delivery extensions.
- 4.6 CONTRACTOR shall provide a qualified safety officer when there is work in the Plant. This safety officer shall not do any other work, other than safety.
- 4.7 Anything not listed in the CONTRACTOR's offer / Exhibit – I, Scope of Work, but appearing on the drawings / attachments shall be completed by CONTRACTOR, with no additional charges.
- 4.8 CONTRACTOR should utilize COMPANY recommended sub-contractors / manufacturers

5. GENERAL REQUIREMENT

The Section 3.0 above shall prevail in the event of any inconsistency on the text hereunder.

5.1 COMPANY'S REPRESENTATIVE

COMPANY will maintain, as required, a representative hereafter called the "COMPANY Representative". COMPANY Representative will provide liaison between COMPANY and CONTRACTOR and represent COMPANY in all matters covered by this Contract, including negotiating and approving changes.

COMPANY's Representative will be the only COMPANY employee authorized to represent COMPANY with respect to this Contract. Examples of his functions are to:

5.1.1 Review and approve designs, specifications, requisitions and purchase orders as required by this Contract.

5.1.2 Establish and maintain field liaison between CONTRACTOR's Representative and COMPANY.

5.1.3 Review CONTRACTOR's construction schedule and field performance.

5.1.4 Make such inspections of the Facility during construction, as COMPANY may desire in order to check the progress of the Work and quality of workmanship and Materials.

5.1.5 Negotiate and approve field changes.

5.1.6 Review CONTRACTOR's administrative procedures.

5.1.7 If, in COMPANY's considered opinion, the conduct or performance of any of CONTRACTOR's personnel is unsatisfactory in any way, CONTRACTOR, if COMPANY so requests, shall at CONTRACTOR's sole cost and expense promptly replace such person or persons with personnel suitably qualified.

At the start of Work, CONTRACTOR shall develop procedures for handling

correspondence, Material orders, quotation analyses, drawings, schedules and other administrative or engineering aspects of Work to the satisfaction of COMPANY.

5.2 CONTRACTOR's PERSONNEL

CONTRACTOR shall assign a full-time Project Manager (hereafter called "CONTRACTOR Representative") to provide liaison between CONTRACTOR and COMPANY and to represent CONTRACTOR in all matters covered by this Contract, including negotiating and approving COMPANY's authorized changes. The CONTRACTOR's Representative shall not be changed during the course of the Work unless COMPANY approves such change in writing.

When fieldwork is in progress CONTRACTOR's Representative shall act in full charge of CONTRACTOR's fieldwork and maintain field liaison between CONTRACTOR and COMPANY's Representatives. Examples of his functions are to:

5.2.1 Negotiate and approve for CONTRACTOR, COMPANY's field changes authorized by COMPANY.

5.2.2 Represent CONTRACTOR in matters pertaining to construction performance and quality, scheduling, administrative procedures and financial controls

5.2.3 Represent CONTRACTOR during all required tests.

5.2.4 Coordinate with COMPANY Project Engineer on all job activities

5.2.5 Remove any person from CONTRACTOR staff in case the same is not fully complying with the COMPANY requirements or when requested by COMPANY Representative and shall provide a suitable replacement within a week time and without affecting the work progress.

5.3 KEY PERSONNEL

CONTRACTOR shall maintain the following persons at the job site on a full-time basis at all times during the course of the Work and shall not remove or reassign such personnel without COMPANY's prior approval:

- a. CONTRACTOR's Project Manager
- b. Safety Engineer
- c. Quality Control Engineer.
- d. Work Permit Receiver
- e. Direct working resources and staff

5.4 SPECIAL TOOLS FOR EQUIPMENT INSTALLATION

All special tools and/or equipment required for installation and/or maintenance of equipment shall be furnished by CONTRACTOR.

5.5 WORK PERMITS

At least thirty (30) days prior to mobilization, CONTRACTOR shall familiarize himself with COMPANY's Plant Operations and Maintenance Work Permit procedures and CONTRACTOR's workers shall be trained to receive Work Permits in a timely manner. After approval by COMPANY, CONTRACTOR shall comply with this Work Permit procedure. COMPANY will not be responsible for delays due to CONTRACTOR's failure

to submit its Work Permits in a timely fashion or failure to comply with the approved Work Permit procedure.

5.6 FIELD INSPECTION

5.6.1 Inspection by COMPANY

COMPANY may visit and inspect any and all of the Work and Materials at any time, and CONTRACTOR shall provide safe and proper facilities therefor. CONTRACTOR shall at all times during the performance of the Work keep a competent supervisor, fluent in the English language, in the immediate vicinity of the Work areas to receive communications from COMPANY and to supervise the performance of this Contract.

COMPANY shall inspect all works and witness all tests. Prior notice shall be given to COMPANY for any inspection or witnessing as:

- a. THREE (03) working days for inside the COMPANY facility.
- b. FOURTEEN (14) working days for outside the COMPANY facility.
- c. Testing requirements shall be based on COMPANY inputs.
- d. CONTRACTOR to determine hold points for inspection and test witnessing.
- e. COMPANY reserves the right to assign any 3rd party inspection agency, as needed.

5.6.2 CONTRACTOR's Inspection Responsibility

CONTRACTOR shall be solely responsible for thorough inspection and testing of the Work and for the quality of the Work. COMPANY's inspection of, testing of, approval of, or agreement to the performance of any part of the Work shall in no way relieve CONTRACTOR of its responsibility for the Work. CONTRACTOR shall:

5.6.2.1 Submit Inspection Testing Plan for COMPANY review and comments.

5.6.2.2 Must submit their QA/QC for review and approval prior to awarding of contract.

5.6.3 Inspection by CONTRACTOR

Whenever any part of CONTRACTOR's Work depends on existing work or work or Material provided by COMPANY or others, CONTRACTOR shall inspect and measure such other work or Material and promptly notify COMPANY of each defect or discrepancy in such other work or Material that may render it unsuitable for proper execution of CONTRACTOR's Work or proper functioning of the Facility. If CONTRACTOR fails to notify COMPANY's Representative of any such defect or

discrepancy before performing CONTRACTOR's independent Work, and such defect or discrepancy would have been discovered in the course of a reasonably thorough visual inspection and measurement, COMPANY may condemn the Work or Material involved and CONTRACTOR shall correct such defect or discrepancy on the same basis as if it were defective Work by CONTRACTOR as per General Terms and Conditions (copy attached).

5.7 COMPLETION

5.7.1 Mechanical Completion

CONTRACTOR shall cause Mechanical Completion of the Facility to occur. Mechanical Completion shall mean that all requirements of this Contract have been met with respect to:

- 5.7.1.1 Construction
- 5.7.1.2 Safety
- 5.7.1.3 Ability to physically operate

Prior to Mechanical Completion, CONTRACTOR shall demonstrate to COMPANY all portions of the facility:

- have been built according to the terms of this contract
- operate as intended

5.7.2 Acceptance by COMPANY

All Work will be subject to Acceptance by COMPANY pursuant this Exhibit—I Scope of Work.

5.8 TIME FOR COMPLETION

5.8.1 Initial Time for Completion

CONTRACTOR shall cause the Facility to achieve Mechanical Completion, on or before the applicable date specified in the contract. The time for completion shall be extended only in accordance with the provisions of the Terms and Conditions. COMPANY shall reduce the time for completion only with the written consent of CONTRACTOR.

5.8.2 Failure to Maintain Schedule

If at any time during the progress of the Work, CONTRACTOR's actual progress is inadequate to meet the approved schedule and as established, COMPANY shall have the right, but not the obligation, to so notify CONTRACTOR who shall thereupon take such steps as may be necessary to remedy the inadequacy. If within a reasonable period (as determined by COMPANY and not to exceed THREE (03) working days) CONTRACTOR does not improve performance to meet the schedule, COMPANY may require an increase in labor force, number of shifts, overtime operations, or additional days of work per week without additional compensation to CONTRACTOR, to eliminate or reduce the possibility of delayed completion. COMPANY may make such requirements in

addition to any other rights or remedies that COMPANY may have.

5.8.3 Failure to Complete on Schedule

If CONTRACTOR does not cause the Facility to achieve Mechanical Completion within the time, COMPANY may elect to take over and complete the Work pursuant to the Terms and Conditions. COMPANY may take over and complete the Work in addition to any other rights or remedies that COMPANY may have.

6. MATERIALS, SERVICES AND UTILITIES FURNISHED BY COMPANY

COMPANY shall furnish or cause to be furnished to CONTRACTOR, the following items for or in connection with performance of the Work.

- 6.1 **COMPANY** shall provide: Please refer clause no. 1.2 & 2.6
- 6.2 In addition to Clause no. 1.2, **CONTRACTOR** should provide
 - 6.2.1 Providing a Level –II T/A schedule showing start date, sequence of activities, end date, crew sizes and craft mix. All work is to be planned and scheduled to complete as soon as possible. After award of PO contractor will submit detailed plan in Primavera
 - 6.2.2 Arranging receipt and transfer of all non-consumable material from the COMPANY T/A Warehouse to the work location. CONTRACTOR will return the balance of unused and undamaged material to the T/A warehouse after completion of work.
 - 6.2.3 Supplying all qualified labor, supervision, tools, equipment, technical support, consumables, expendables, and temporary supplies necessary for, and reasonably incidental to complete Repair & Cleaning of Columns
 - 6.2.4 Providing necessary consumable and expendable supplies in sufficient quality and quantity for personnel to perform the scope of work safely and efficiently.
 - 6.2.5 Providing, Breathing Apparatus for blinding, Air compressor, Certified & Tested Lifting & Pulling tools and tackles, Calibrated Pressure gauges, Test equipment, Safety Device, chemical hoses Hand Tools & Power Tools etc. These should meet or exceed COMPANY relevant GI's.
 - 6.2.6 Blind lists provided in bidding package are tentative for estimation purpose. Blinding at site to be done as per Operations Blind list provided with marked up PID's. These lists will be provided at later stage after award of PO.
 - 6.2.7 Provide forklifts and qualified forklift operators holding valid Saudi driving license. Forklift operators are required to attend COMPANY Powered Industrial Truck (PIT) training per COMPANY General Instruction. CONTRACTOR will schedule personnel for

pre-T/A PIT training at the request and timing specified by COMPANY T/A management.

7. REPORTING REQUIREMENTS

7.1. CONTRACT DAILY REPORT

CONTRACTOR shall submit progress reports at end of each shift which provide manpower (including manual, non-manual and sub-contractors) present for work, a listing of all equipment on site (detailed by type and quantity), and any Safety related issues. Reports shall be submitted in the format established with continuation pages on forms proposed by CONTRACTOR and acceptable to the COMPANY Representative.

7.2. DAILY PROGRESS REPORT

CONTRACTOR shall submit a written daily progress report, which will cover daily field work. The report shall summarize the status of job and the overall progress achieved for the CONTRACTOR's detailed work schedule.

8. DATA REQUIREMENTS

- 1.1. After completion of turnaround contractor will submitted detailed report. This report will contain technical details, manpower & logistic details.

9. QUALITY CONTROL REQUIREMENTS

9.1. QUALITY PLAN

- 9.1.1. CONTRACTOR shall provide a comprehensive; project specific Quality Plan that identifies CONTRACTOR's procedures for Quality Control during the Construction execution phase of the Work. The Quality Plan shall be presented to COMPANY for approval at least 45 days prior to beginning turnaround. After approval by COMPANY, CONTRACTOR shall comply with requirements of the Quality Plan.
- 9.1.2. Should any inspection or test reveal any defect in CONTRACTOR supplied materials or in CONTRACTOR's Work, CONTRACTOR shall correct such defect at no cost to COMPANY.

9.2. QUALITY INCHARGE

CONTRACTOR shall provide a full-time QC who shall be responsible for the coordination of CONTRACTOR's construction quality surveillance, inspection, testing, and documentation activities.

10. CONSTRUCTION

- 10.1. All Construction Access, Construction Methods, Temporary Facilities and Work Areas shall conform to and be in compliance with COMPANY Operations, Standard Industry requirements and where applicable Royal Commission for Jubail Construction Safety requirements.

10.2. Turnaround Execution Plan

CONTRACTOR shall develop and submit to COMPANY a detailed project specific turnaround Execution Plan at least 60 days prior to the start of turnaround.

10.3. Security Program

CONTRACTOR is responsible for the security of its workers, tools, materials and equipment (and to and from) the jobsite. All small tools and construction equipment belonging to CONTRACTOR must be clearly identified as such. Tools including personal tools are subject to inspection at the security gate upon arrival and departure.

10.4. Construction Area Limits

COMPANY shall designate the boundary limits of access roads, parking areas, storage areas, and construction areas. CONTRACTOR shall not trespass in or on areas not so designated. CONTRACTOR shall be responsible for keeping all of its personnel out of areas not designated for CONTRACTOR's use. In the case of isolated work located within such areas, CONTRACTOR shall obtain permits to enter and perform the Work. CONTRACTOR shall keep all vehicles, equipment, materials and personnel in such areas as designated by COMPANY.

10.5. CONTRACTORS Office at Site of Work

During the execution of this Contract, COMPANY will provide office for project manager & coordinator in separate or shared office building

10.6. CONTRACTOR Supplied Temporary Buildings

Any CONTRACTOR supplied temporary construction buildings shall be fire retardant and shall include fire protection equipment. The location, size(s), quantity and type(s) of temporary buildings shall be subject to COMPANY's review and approval.

10.7. Personnel Identification

CONTRACTOR's personnel and Sub-contractor personnel shall have in their possession all required, and properly validated licenses, certificates or identification badges prescribed by COMPANY or the Saudi Arabian Government.

CONTRACTOR shall wear and provide identification badges to all its employees working either directly or indirectly under its supervision. These badges must be worn conspicuously by these employees at all times when on the jobsite. CONTRACTOR shall provide Temporary badges and safety gear for visitors and delivery personnel.

10.8. Smoking

Smoking shall only be allowed in the designated smoking areas.

10.9. Dust Control

CONTRACTOR, for the duration of the Contract, shall maintain all excavations, embankments, haul roads, plant sites, waste disposal areas, borrow areas, and all other work areas free from dust, as determined by COMPANY. Industry-accepted methods of dust control suitable for the area involved, such as sprinkling, chemical treatment, tight bituminous treatment or similar methods, with COMPANY approvals, will be permitted. No separate payment will be made for dust control.

10.10. Water Pollution

CONTRACTOR shall, at own expense, provide suitable facilities to prevent the introduction of any substances or materials into any stream, lake or other body of water which may pollute the water or constitute substances or materials deleterious to fish, wildlife and domestic stock.

10.11. Air Pollution

CONTRACTOR shall also perform the Work so as not to discharge into the atmosphere from any source whatever smoke, dust, or other air contaminants in violation of the laws, rules and regulations of the government entities having jurisdiction.

10.12. Fuels & Lubricant

CONTRACTOR shall be responsible for the proper handling, transportation, storage and use of fuels and lubricants and shall, at CONTRACTOR's sole expense, make good any damage caused by its handling, transporting, storage and use of fuels and lubricants.

10.13. Ventilating

10.13.1. CONTRACTOR shall prevent hazardous accumulations of dust, fumes, mists, vapors or gases in areas occupied during construction.

10.13.2. CONTRACTOR shall provide local ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.

10.13.3. CONTRACTOR shall dispose of materials in manner that will not result in harmful exposure to persons or disrupt or otherwise effect operation of existing facilities.

10.13.4. CONTRACTOR shall ventilate storage spaces containing hazardous, volatile or high temperature sensitive materials.

10.14. Site Signs

Identification signboards and notices for safety or instruction are permitted on site only after approval of COMPANY for format, location and quantity.

10.15. Drainage

CONTRACTOR shall provide proper and adequate drainage for its construction, storage, parking and fabrication areas including the necessary piping for disposal to COMPANY ditches, or sewers. Temporary drainage facilities shall be removed upon completion of Work unless COMPANY directs to have the facilities left in place. CONTRACTOR shall be responsible for providing and operating any temporary pumps for keeping its area drained. CONTRACTOR shall furnish and place any necessary surfacing material to avoid loss of time due to muddy conditions.

10.16. Lunch and Toilet Facilities

Company shall provide necessary lunch and toilet facilities for CONTRACTOR personnel... CONTRACTOR shall provide meals to their manpower during breaks in lunch tent.

10.17. Construction Entrance

Access into COMPANY work site shall be through TA gate.

10.18. Review by COMPANY

Review and approval of CONTRACTOR's rigging, scaffolding and other construction plans by COMPANY, shall not constitute or to be construed as an assumption of

CONTRACTOR's responsibility or liability for scaffolding or safety under the Contract or at law, and does not relieve CONTRACTOR from full compliance with its legal and contractual obligations.

10.19. Interference

It is understood that the COMPANY may itself perform Work at or near the CONTRACTOR's Work site, or have such Work performed by others. CONTRACTOR agrees to cooperate fully with COMPANY or any other Contractor performing such Work, and not to interfere with the performance of such Work.

10.20. Site Clean Up

CONTRACTOR shall maintain the site in a safe and orderly condition by daily removal and disposal of accumulated rubbish and waste material. Temporary equipment shall be removed immediately upon completion of the WORK requiring the equipment. Upon completion of the Work, CONTRACTOR shall clear the site of all remaining CONTRACTOR's temporary facilities, temporary equipment, debris, tools, and material used in the Work. Where CONTRACTOR, upon written notice from the COMPANY, fails to maintain the site in a safe and orderly condition, the COMPANY will have the site maintenance Work performed and deduct the cost from the CONTRACTOR invoice.

10.21. Heavy lifts

CONTRACTOR shall provide a heavy lift plan for all lifts over FIVE (05) tons, for COMPANY's review and approval.

11. ENVIRONMENTAL REQUIREMENTS

11.1. General Requirements

CONTRACTOR shall plan, execute and complete all work such that there are zero environmental incidents and no detrimental environmental impacts to the local population, workers, air, water, soil, plants and animals.

11.2. Environmental Care and Response Plan

CONTRACTOR shall submit a Project Specific Environmental Care and Response Plan in compliance with the Saudi Arabian Government, and Saudi Chevron Petrochemical Environmental Standards. The Environmental Plan shall provide specific plans and procedures to address compliance with these Standards and shall be submitted for COMPANY review prior to commencement of the Work.

11.3. Environmental Care Practices

CONTRACTOR shall perform the Work in accordance with all environmental care practices, applicable local and national rules, regulations and codes taking all reasonable precautions to protect the facility, adjacent facilities, workers and the public. CONTRACTOR shall have materials and equipment on site to minimize, control and mitigate incidences of uncontrolled releases of materials to the air, water or land.

11.4. Environmental Care Orientation Meeting

CONTRACTOR's in-Kingdom supervisory personnel, including supervisory personnel of CONTRACTOR subcontractors, shall attend an environmental care orientation meeting, prior to commencing the Work. This meeting shall last at least two (2) hours and shall be separate from any safety or security orientation.

COMPANY may, at its sole discretion, audit CONTRACTOR environmental care orientation meetings.

11.5. Accidents and spills

Accidents, spills, uncontrolled releases to air, water, and land or other environmental incidents and "near misses" shall be orally reported to COMPANY at the time of the

incident. CONTRACTOR shall submit written reports, in a format developed with COMPANY, within twenty-four (24) hours after each incident. CONTRACTOR shall maintain a jobsite record of such environmental incidents and "near misses" which shall be submitted to COMPANY upon written request.

11.6. CONTRACTOR's Responsibility

CONTRACTOR shall be wholly responsible for construction means, methods, techniques, sequences or procedures for environmental precautions and programs in connection with the Work. COMPANY shall not, in any way, be responsible for CONTRACTOR's failure to employ such precautions.

END

EXHIBIT-I